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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/811,081

03/16/2001

Thomas Mossberg

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6284

23892

7590

06/15/2004

DAVID S ALAVI

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EUGENE, OR 97402

EXAMINER

AMARI, ALESSANDRO V

ART UNIT

PAPER NUMBER

2872

DATE MAILED: 06/15/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/811,081

Applicant(s)

MOSSBERG, THOMAS

Examiner

Alessandro V. Amari

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 April 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 12-16, 18-23, 35, 45-54, 113-115, 118-120 and 137-139 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 12-16, 18-23, 35, 45-54, 113-115, 118-120 and 137-139 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 March 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 02 April 2004 has been entered.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 35, 113-115 and 137-139 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Regarding claims 137 and 138, the recitation of "a second plurality of diffractive elements" is not described in the specification or shown in the drawings. This constitutes new matter. Claims 35, 113-115 and 139 inherit the same issue due to their dependence on claim 137.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 12-16, 23, 45-54 and 107 are rejected under 35 U.S.C. 102(b) as being anticipated by Maeda et al US Patent 4,824,193.

In regard to claims 12 and 45, Maeda et al teaches (see for example, Figures 1, 3(A), 7-10, 12), an optical apparatus or a method comprising a substrate (1) that propagates optical signals in at least two dimensions; a first port (7); a second port (8a-8e); and a plurality of diffractive elements within the substrate, the plurality of diffractive elements being arranged such that the plurality of diffractive elements exhibit a positional variation in at least one of amplitude, optical separation, and spatial phase over some portion of the substrate as described in column 4, lines 18-65, each of the plurality of diffractive elements provides reciprocal focusing between the first port and the second port as shown in Figure 3(A) and as described in column 4, lines 66-68 and column 5, lines 1-52, and when a first optical signal having a first spatial wavefront and a first temporal waveform is introduced into the substrate through the first port, the plurality of diffractive elements apply a transfer function to the first optical signal to produce a second optical signal having a second spatial wavefront and a second temporal waveform, wherein the first and second spatial wavefronts differ in at least spatial wavefront shape and the first temporal waveform differs from the second

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temporal waveform and focus the second optical signal to exit the substrate through the second port as described in column 4, lines 66-68, column 5, lines 1-52, column 8, lines 57-68, column 10, lines 4-10, column 11, lines 40-68, column 12, lines 1-50, column 13, lines 46-68, column 14, lines 1-68, column 15, lines 1-68 and column 16, lines 1-36.

Regarding claims 13 and 49, Maeda et al teaches that the input optical signal includes an optical pulse as described in column 1, lines 7-20, column 4, lines 66-68 and column 5, lines 1-52. Although the prior art does not specifically disclose an optical pulse, this feature is seen to be an inherent teaching of that device since the device is described as being used in optical fiber communications which use optical pulses.

Regarding claim 14, Maeda et al teaches (see Figures 3(A), 8) an input optical waveguide for introducing an input optical signal into the substrate through the first port as described in column 5, lines 23 and 35.

Regarding claim 15, Maeda et al teaches an output optical waveguide for receiving an output optical signal exiting the second port as described in column 5, lines 27-28.

Regarding claims 16 and 54, Maeda et al teaches that the optical device forms an optical waveform cross-correlator as described in column 4, lines 66-68, column 5, lines 1-52, column 8, lines 57-68, column 10, lines 4-10, column 11, lines 40-68 and column 12, lines 1-50.

Regarding claims 23 and 48, Maeda et al teaches that the first optical signal has a first direction of propagation and the second optical signal has a second direction of

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propagation and where the first direction of propagation is not collinear to the second direction of propagation as shown in Figures 3A, 8 and 12.

Regarding claim 46, Maeda et al teaches that the transfer function includes spatial transformation information as described in column 4, lines 66-68, column 5, lines 1-52, column 8, lines 57-68, column 10, lines 4-10, column 11, lines 40-68, column 12, lines 1-50, column 13, lines 46-68, column 14, lines 1-68, column 15, lines 1-68 and column 16, lines 1-36.

Regarding claim 47, Maeda et al teaches that the second optical signal is spatially transformed from the first optical signal as shown in Figures 3A, 8 and 12.

Regarding claims 50-53, Maeda et al teaches that the second optical signal is spectrally and spatially transformed from the first optical signal and that the transfer function includes spectral and spatial transformation information as described in column 4, lines 66-68, column 5, lines 1-52, column 8, lines 57-68, column 10, lines 4-10, column 11, lines 40-68, column 12, lines 1-50, column 13, lines 46-68, column 14, lines 1-68, column 15, lines 1-68 and column 16, lines 1-36.

Regarding claim 107, Maeda et al teaches that each portion of the first spatial wavefront contributes to the second optical signal as described in column 4, lines 66-68, column 5, lines 1-52, column 8, lines 57-68, column 10, lines 4-10, column 11, lines 40-68, column 12, lines 1-50, column 13, lines 46-68, column 14, lines 1-68, column 15, lines 1-68 and column 16, lines 1-36.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 18, 19, 20, 35, 137 and 138 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maeda et al US Patent 4,824,193 in view of Tien US Patent 4,140,362.

Regarding claims 18, 19, 20, 35, 137 and 138, Maeda et al teaches the invention as set forth above and regarding claim 20, teaches (see Figures 3(A), 8 and 12) an input waveguide and an output waveguide wherein the input optical signal originates from the input waveguide and the output optical signal converges to an output waveguide as described in column 5, lines 29-52 and column 13, lines 46-54 and as shown in Figures 3(A), 8 and 12 and regarding claim 35, teaches that the first optical signal is an optical pulse as described in column 1, lines 7-20, column 4, lines 66-68 and column 5, lines 1-52. Although the prior art does not specifically disclose an optical pulse, this feature is seen to be an inherent teaching of that device since the device is described as being used in optical fiber communications which use optical pulses. Also, regarding claims 137 and 138, Maeda et al teaches (see Figures 3(A) and 12) a third port (8a-8e).

However, in regard to claim 18, Maeda et al does not teach that each of the diffractive elements has a spherical contour and a center of curvature or regarding claim

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19, that the centers of curvature of the diffractive elements are coincident or regarding claim 20, that the respective input and output waveguides are located at respective conjugate image points of the plurality of diffractive elements whose centers of curvature are coincident. Further, regarding claims 137 and 138, Maeda et al does not further teach a second plurality of diffractive elements within the substrate, the second plurality of diffractive elements being arranged such that the second plurality of diffractive elements exhibit a positional variation in at least one of amplitude, spatial separation and spatial phase over some portion of the substrate, each of the second plurality of diffractive elements provides reciprocal focusing between the first port and the third port, and when the first or third optical signal having a first or third spatial wavefront and the first or third temporal waveform is introduced through the first or third port, the second plurality of diffractive elements, apply a second transfer function to the first or third optical signal so as to produce a third or second optical wavefront having a third or second spatial wavefront, wherein the first and third spatial wavefronts or the second and third spatial wavefronts differ in at least spatial wavefront shape and the first or second temporal waveform differs from the third temporal waveform and focus the third or second optical signal to exit the substrate through the third port.

Regarding claim 18, Tien does teach that each of the diffractive elements has a spherical contour and a center of curvature as shown in Figures 2A-2C, 2E and 2G and as described in column 1, lines 28-45, column 31-68 and column 4, lines 1-2.

Regarding claim 19, Tien does teach that the centers of curvature of the diffractive elements are coincident as shown in Figures 2A-2C, 2E and 2G.

Regarding claim 20, Tien teaches that the respective input and output waveguides are located at respective conjugate image points of the plurality of diffractive elements whose centers of curvature are coincident as shown in Figures 2A-2C, 2E and 2G and as described in column 1, lines 28-45, column 31-68 and column 4, lines 1-2.

Regarding claims 137 and 138, Tien does further teach (see Figures 2A-2C, 2E and 2G) a second plurality of diffractive elements within the substrate, the second plurality of diffractive elements being arranged such that the second plurality of diffractive elements exhibit a positional variation in at least one of amplitude, spatial separation and spatial phase over some portion of the substrate, each of the second plurality of diffractive elements provides reciprocal focusing between the first port and the third port, and when the first or third optical signal having a first or third spatial wavefront and the first or third temporal waveform is introduced through the first or third port, the second plurality of diffractive elements, apply a second transfer function to the first or third optical signal so as to produce a third or second optical wavefront having a third or second spatial wavefront, wherein the first and third spatial wavefronts or the second and third spatial wavefronts differ in at least spatial wavefront shape and the first or second temporal waveform differs from the third temporal waveform and focus the third or second optical signal to exit the substrate through the third port as shown in Figures 2A-2C, 2E and 2G and as described in column 1, lines 28-45, column 31-68 and column 4, lines 1-2.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the diffractive elements of Tien in the apparatus of Maeda et al in order to produce integrated optical gratings thus providing for a more compact device.

8. Claims 108-110 and 118-120 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maeda et al US Patent 4,824,193 in view of Weverka US Patent 5,165,104.

Regarding claims 108-110 and 118-120, Maeda et al teaches the invention as set forth above but does not teach in regard to claim 108, that the substrate resides within a planar optical waveguide, the first optical signal interacting with the plurality of diffractive elements while propagating within the planar waveguide, propagation of the first optical signal within the planar waveguide being substantially guided in at least one dimension by the planar waveguide or regarding claim 109, further comprising a channel waveguide positioned to introduce the first optical signal into the planar waveguide through the first port or regarding claim 110, further comprising a channel waveguide positioned to introduce the second optical signal into the planar waveguide through the second port or regarding claim 118, that the diffractive elements residing within a planar optical waveguide, the first signal interacting with the diffractive elements while propagating within the planar waveguide, the first port and the second port being positioned at an edge of the planar waveguide, propagation of the first optical signal within the planar waveguide being substantially guided in at least one dimension by the planar waveguide or regarding claim 119, further comprising a channel waveguide

positioned to introduce the first optical signal into the planar waveguide through the first port or regarding claim 120, that the second optical signal being diffracted to a channel waveguide positioned so as to receive the second optical signal from an edge of the planar waveguide through the second port.

Regarding claims 108-110 and 118-120, Weverka does teach (see Figure 1) a substrate residing within a planar optical waveguide as described in column 3, lines 48-61, the input optical signal interacting with the diffractive elements while propagating within the planar waveguide, each of the first and second ports being positioned at the edge of the planar waveguide, the input optical waveguide being a channel waveguide and the output optical waveguide being a channel waveguide as shown in Figure 1 and as described in column 5, lines 58-68 and column 6, lines 1-10.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the planar waveguide form factor as taught by Weverka for the optical apparatus of Maeda et al in order to produce a modular apparatus which can be networked and reduces optical losses so as to provide for an improved optical interconnection.

9. Claims 113-115 and 139 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maeda et al US Patent 4,824,193 in view of Tien US Patent 4,140,362 and further in view of Weverka US Patent 5,165,104.

Regarding claims 113-115 and 139, Maeda et al in view of Tien teaches the invention as set forth above but does not teach in regard to claim 113, that the substrate resides within a planar optical waveguide, the first optical signal interacting with the

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plurality of diffractive elements while propagating within the planar waveguide, propagation of the first optical signal within the planar waveguide being substantially guided in at least one dimension by the planar waveguide or regarding claim 114, further comprising a channel waveguide positioned to introduce the first optical signal into the planar waveguide through the first port or regarding claim 115, further comprising a channel waveguide positioned to introduce the second optical signal into the planar waveguide through the second port or regarding claim 139, further comprising a second channel waveguide positioned so as to receive the third optical signal output from an edge of the planar waveguide through the third port.

Regarding claims 113-115 and 139, Weverka does teach (see Figure 1) a substrate residing within a planar optical waveguide as described in column 3, lines 48-61, the input optical signal interacting with the diffractive elements while propagating within the planar waveguide, each of the first, second and third ports being positioned at the edge of the planar waveguide, the input optical waveguide being a channel waveguide and the output optical waveguide being a channel waveguide as shown in Figure 1 and as described in column 5, lines 58-68 and column 6, lines 1-10.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the planar waveguide form factor as taught by Weverka for the optical apparatus of Maeda et al in view of Tien in order to produce a modular apparatus which can be networked and reduces optical losses so as to provide for an improved optical interconnection.

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10. Claims 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maeda et al US Patent 4,824,193.

Regarding claims 21 and 22, Maeda et al does not teach that the first port is separated from the second port by a distance equal to or less than about 5000 microns or that the first port is separated from the second port by a distance between about 5000 microns and about 25 microns.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to separate the first port and second port by the micron ranges claimed, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. One would have been motivated to fix the separation distances for the purpose of focusing the input and output waveforms on the waveguides. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235.

Response to Arguments

11. Applicant's arguments with respect to claims 12-16, 18-23, 35, 45-54, 113-115 and 118-120 have been considered but are moot in view of the new ground(s) of rejection.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alessandro V. Amari whose telephone number is (571) 272-2306. The examiner can normally be reached on Monday-Friday 8:00 AM to 5:30 PM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on (571) 272-2312. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ava 
09 June 2004


MARK A. ROBINSON
PRIMARY EXAMINER